

UNITED STATES GOVERNMENT

~~SECRET~~**2-Way Memo**

Subject: FY 1985 R&D Planning Cycle

To :
➔

A/DD/A/ODP/jw

Reply needed by COB 14 Dec.

FOLD

Sandy:

Attached find DVSAT responses to 3 DDA (which includes ODP) R&D problem statements (DDA #16, 25, 26). Appreciate if you would evaluate relevance, quality, etc of proposed R&D solutions. I am the ODP member of the DDA R&D Panel and I will prepare the ODP evaluation of the SAT package. Need your inputs. Please contact ORD people directly if you need to. (I also need a contact for DDA #25).

Thanks.

REPLY MESSAGE

They look fine to me - You can make me the contact for #25, SDD/ODA

From :

~~SECRET~~**INSTRUCTIONS**

Use routing symbols whenever possible.

SENDER (Originator of message):

Use brief, informal language.

Conserve space.

Forward original and one copy.

RECEIVER (Replier to message):

Reply below the message, keep one copy, return one copy.

DATE OF MESSAGE

9 Dec 1982

ROUTING SYMBOL

TITLE OF ORIGINATOR

C/P & P G/MS

25X1

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DATE OF REPLY

ROUTING SYMBOL

SIGNATURE OF REPLIER

TITLE OF REPLIER

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Problem Number DDA-16

Rank of

PRINCIPAL OFFICE: ORD

Office: ODP

Title: Database Front-ends to Improve User Accessibility

Problem Description:

ODP currently makes use of two database management facilities (RAMIS and GIMS) for almost all applications requiring generalized storage and retrieval of formatted data. There have been several significant developments in the area of human interface to DBMS systems which could potentially improve the useability and accessibility of the database applications. We need to develop an assessment of the new technical advances in this area, as well as the feasibility of applying these techniques to our environment.

Time Requirement:

Continuing problem.

Background/R&D History/References:

This subject has been addressed by previous R&D efforts, but it has not been focused on the existing systems and terminal in ODP.

Benefits/Description of Output:

Data base management is essential to the future of Agency computing and improvements in useability would be beneficial to a wide range of ODP customers. A report describing the potential for application of the techniques would result from the research.

Policy Basis/Justification:

ODP has the responsibility for maintaining a state-of-the-art computer facility for use by Agency components.

Contact: Name
Off. Designator/Location SPD/ODP
Telephone (Black)

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INFORMATION SYSTEMS PROGRAM

COMPUTER LABORATORY FACILITY

ORD/PATG/ISR

25X1

REQUIREMENT:

The volume of intelligence data that must be handled by the Agency is ever increasing. There is a continuing need for an information system program which is focused on enhancing the Agency's information system capabilities. Such a program should address areas of information processing, analysis, dissemination, and other application enhancement areas, such as text search, content analysis, or automatic image analysis. Also, this program includes research and development efforts in the areas of computer hardware and software, electronics, electro-optics, device technology, data communications, system architecture, and other areas of information system technology. Such a program would be the basis for providing the Agency with a continuous state-of-the-art information handling capability.

Source: DDI-LR15, DDA-002, DDA-003, DDA-005, DDA-013, DDA-014, DDA-016, DDA-021, DDA-023, DDA-024

CUSTOMER/SCENARIO:

User: DDI, DDA, DDS&T Components

Customer: DDI, DDA, DDS&T

Scenario: The computer laboratory would function as the primary facility for Agency information system research efforts. The laboratory would be directed by ORD and provide the equipment and personnel necessary to support Agency information system research requirements.

DESCRIPTION:

The laboratory would be located at a contractor maintained facility. The computer laboratory facility contractor would supply the equipment, personnel, and management/support functions necessary to maintain the computer laboratory. The contractor personnel would include lab technicians as well as maintenance, security, and support personnel.

The initial equipment structure of the laboratory would be two distributed computer systems/networks. One of these distributed systems would be an operational system. The other, an experimental hardware testbed.

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INFORMATION SYSTEMS PROGRAM

COMPUTER LABORATORY FACILITYDESCRIPTION:
(Continued)

The operational system would host experiments in the high-level (software) areas. This would include research efforts in the areas of operating system design, performance analysis, data base management systems, languages, communication (high-level) protocols, data processing applications, etc.

The hardware testbed system would be used to conduct experiments in the areas of computer hardware, device technology, fiber optics, electro-optics, communication (low-level) protocols, memory-mass storage device technology, secure design methods, etc.

The initial cost impact of establishing such a facility will be greatly reduced by the resultant decreased per project cost for most information system research efforts. Many ongoing maintenance costs could be absorbed by the contractor, who would have use of the lab facility for their own research programs.

	82	83	84	85	86	87	88	89
<u>FUNDING</u>				1500	200	200	200	

SYSTEM JUSTIFICATION: A computer laboratory would permit ORD to eliminate significant time and cost from research programs. Technology transfer from initial prototype to full operational capability can be greatly facilitated. ORD would be in a unique position to take almost immediate advantage of promising technological areas.

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INFORMATION SYSTEMS PROGRAM

ADVANCED TEXT PROCESSING AND RETRIEVAL

ORD/ISRD/

25X1

REQUIREMENT:

[Agency analysts require rapid and interactive access to large volumes of electrically stored textual information.] This information is largely free-flowing natural language material which may be obtained from a variety of sources: wire services, cables, open source literature, memos, documents and reports, or analyst-generated notes and comments. The specification of search terms for text retrieval remains difficult due, in part, to the large variety of ways in which a relevant phrase may be worded. Analysts need a rapid text searching capability which can permit them to browse through large bodies of text, clarifying their request as they go. The purpose of the planned research is to develop text-oriented tools and techniques which can be implemented in the Agency's computer systems.

Source: FBIS-3, NPIC-RAD-018-b/c, DDA-16,
DDI-LR15, DDI-LR14

CUSTOMER/SCENARIO:

Customers: FBIS, NPIC, OCR, ODP, DDI Analysts, DDA information processing personnel
Scenario: Analysts will have access to electronically stored textual information through MIDAS, SAFE, NDS, VM, CIRC, or other computer systems. Each of these systems will have embedded within it or attached to it an automated text processing and retrieval capability. This capability may be either hardware or software as requirements or circumstances dictate. Analysts will have an interactive query specification and refinement process which allows them to filter the data to obtain information relevant to their need.

DESCRIPTION:

[The planned effort will address integrating previously developed text processing and retrieval tools and techniques into Agency application systems. Aspects of the work include assessment of the suitability of individual techniques for particular applications, design of user interfaces and query languages for text retrieval, and investigation of implementation

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INFORMATION SYSTEMS PROGRAM

ADVANCED TEXT PROCESSING AND RETRIEVALDESCRIPTION:
(Continued)

approaches using microprocessors and VLSI technology.] This project is a merger and continuation of long standing ORD efforts in text retrieval including the development of the High Speed Text Search (HSTS) device, the development of techniques for exploiting open source literature, the development of an advanced text retrieval system, and development of statistical text processing techniques.

FUNDING:
(Dollars in
Thousands)

82	83	84	85	86	87	88	89
245	245	300	400	300	150	150	100

SYSTEM JUSTIFICATION:

ORD text retrieval research programs for FY79-FY83 have identified numerous techniques that can enhance analysts' access to electronic text. VLSI design and development technologies have independently advanced to the point where the implementation of text retrieval algorithms on a chip by 1985 are quite feasible. Planned research in FY-83 and 84 will address the decision of which techniques to implement in hardware and how to integrate them into the Agency's systems.

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INFORMATION SYSTEMS PROGRAM

ENHANCED ANALYSTS ACCESS TO LARGE DATA BASES

ORD/ISRD/

25X1

REQUIREMENT:

[There is a need to develop computerized tools to aid the analyst and other Agency personnel in accessing large and complex data bases.] Analysts need to browse through various data bases (including open source literature, SIGINT, PHOTINT, HUMINT, and cartographic information) to identify and obtain facts relevant to the production of finished intelligence assessments. In processing this data the analyst needs support for conveniently accessing multiple data bases, maintaining personal note files, formulating and testing hypotheses about the data, relating relatively remote facts through a chain of causal reasoning, displaying geographic data on cartographic images, and integrating the data and reasoning into finished intelligence products. Present-day data base management systems in use at the Agency (e.g., RAMIS and GIMS) do not afford a convenient user interface nor a high-enough level of processing capability to meet the analysts' needs. An integrated set of more powerful human/machine interfaces is required to improve the productivity of the analyst in accessing electronic data bases. The purpose of the continuing research program is to develop a collection of automated tools and techniques for higher-level human/machine communication, logical inference and reasoning, data base query formulation, geographic/cartographic display, and data-to-information synthesis.

Source: DDI-LR15, DDA-16, DDA-29, NPIC-RAD-018
b/c

CUSTOMER/SCENARIO:

Customers: Analysts in DDI, DDO, and NPIC;
Information processing personnel in DDA
Scenario: Analysts will have access to a large and growing volume of diverse information stored electrically under various automated data base management systems. These systems will manage data in support of applications developed for NDS, SAFE, VM and several other computing environments. Higher order query capabilities will allow the analyst to deal in complex information concepts and have those concepts automatically translated into a network of

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INFORMATION SYSTEMS PROGRAM

ENHANCED ANALYSTS ACCESS TO LARGE DATA BASESCUSTOMER/SCENARIO:
(Continued)

simpler data concepts. This network will then be used to generate a potentially large or complex series of searches through the appropriate data bases by automatically generating queries to one or more data base management systems. The data returned by these queries would then be combined using rules of formal logic and reasoning to answer the original high-level question. Graphical representation of facts overlaid on maps will also be used to aid analyst's understanding of large data bases.

DESCRIPTION:

[The planned effort will integrate previously developed automated logic processing capabilities (e.g., DADM) and powerful analyst's workstation prototypes (e.g., Golden Tiger) with newly developed query and presentation techniques (e.g., natural language, symbolic or graphical input/output, and computer generated maps). New methods for controlling distributed data and merging data from central reference files with local analyst's working files will also be investigated. The project will include an architectural study and design of modular approaches to integrating various user interfaces with a variety of underlying data base management systems.]

FUNDING:
(Dollars in
Thousands)

82	83	84	85	86	87	88	89
192	450	500	500	500	300	300	200

JUSTIFICATION:

ORD research programs in Intelligent Data Access Symbolic Representation of Information, and the Golden Tiger Workstation during FY-82/83 indicate tremendous potential for improving analysts access to large data bases. In addition, in FY-83 ORD's research program in Geographic/Cartographic data bases will begin to address the integration of geographic factual data with computer generated maps. Approaches to distributing cartographic information among the mainframe and the workstation will also be investigated in FY-83/84.

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Problem Number DDA-25

Rank of

Office: ODP

PRINCIPAL OFFICE: ORD

Title: Approaches to Requirements Analysis and Derivation

Problem Description:

The design and construction of information systems is a complex process, often characterized by misunderstood requirements and expectations, underestimated costs and schedules, and systems which are difficult to change. Progress is being made on several fronts based on increased understanding of the basis for requirements analysis. Some steps of the design process are being codified and languages are being proposed for more precise communications among designers and between designers and requirements analysts.

Time Requirement:

Continuing.

Background/R&D History/References:

This problem statement was first surfaced in the FY84 R&D planning exercise

Benefits/Description of Output:

Any advance in training, tools or techniques would improve the productivity of staff and the quality of the software product.

Policy Basis/Justification:

ODP has the responsibility for developing software in support of Agency and selected Intelligence Community customers.

Contact: Name _____
Off. Designator/Location ODP
Telephone (Black) _____

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2821
INFORMATION SYSTEMS PROGRAMSOFTWARE ENGINEERING TECHNOLOGY

ORD/ISRI [REDACTED]

25X1

REQUIREMENT:

[Software development is a costly, labor-intensive, error-prone activity. Promising software development methodologies need to be evaluated. Management tools are needed to apply promising methods to development of software for the Agency.] As computer hardware has become less costly and more powerful, computer software has become an impediment to exploiting the full advantages of hardware technology. Software production, according to DoD estimates, now absorbs approximately 90 percent of computer system acquisition costs. Software costs continue throughout the life of an automated system for maintenance and modification of the original system software to correct operational deficiencies or respond to changing requirements. An abundance of software engineering techniques exist which can be applied to the software life cycle from requirements analysis to design, coding, integration, testing, and maintenance. However, the application of these techniques is not straightforward because comparative evaluations of software development techniques are sparse and the software industry has devoted little attention to the management issue of technology transfer. Thus, in some cases attempts to make use of better methods of software development have failed because adequate technology implementation plans were not developed. Improved techniques for managing the development of computer software both in-house and under contract will enable effective auditing of software projects for early detection of potential problems.

Source: DDA 25, DDA 26, DDA 27

CUSTOMER/SCENARIO:

Customer: ODP; OD&E

Scenario: Managers of software programs will have a variety of tools available to them to enable more effective evaluation of software production techniques based on performance parameters and characteristics of the system under development. Such tools will enable selection of complementary methods of production

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INFORMATION SYSTEMS PROGRAM

SOFTWARE ENGINEERING TECHNOLOGYCUSTOMER/SCENARIO:
(Continued)

and documentation for the different software development stages, monitor ongoing projects, and identify critical points in the development process for management intervention. Technology transfer plans will be incorporated into these management tools. These tools will also enable better estimation of software costs and schedules based on analysis of software attributes and development methodologies.

DESCRIPTION:

An analytic framework will be developed with the customer to classify Agency software projects based on attributes of the software systems. Metrics will be developed for software characteristics and programmer/developer performance. Statistical techniques will be developed for software estimation and prediction based on post Agency and industry software experience. These statistical techniques will include trend analysis tools to predict future performance on a project based on current observables, and tools to detect significant deviations from expected values on critical performance metrics for management intervention.

FUNDING:

82	83	84	85	86	87	88	89
-	-	-	200	325	325	150	-

SYSTEM JUSTIFICATION:

Recent advances in software engineering technology from both government and industry promise applicability to Agency needs. However analysis of the classes of Agency problems is needed and methodologies for applying appropriate techniques must be developed.

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Problem Number DDA-26

Rank of

Office: ODP

PRINCIPAL OFFICE: ORD

Title: Management of Large Software Development Contracts

Problem Description:

R&D should be performed which would have as its end result a recommended methodology for the management of large software development contracts. This methodology should be a tool to assist Agency project management offices in delivering software developed under contract, that satisfies Agency requirements and is on time and within cost.

Time Requirement:

Continuing.

Background/R&D History/References:

This problem statement was first surfaced in the FY84 R&D planning exercise.

Benefits/Description of Output:

The execution of large software development contracts in CIA is becoming increasingly more commonplace (e.g., SAFE, CAMS2, NDP). The successful completion of these projects is imperative. The Agency, like most outside organizations, has had only limited success in this area. Any improvement through the use of standardized management approaches, tools, and training etc, would be of great benefit both in terms of cost and operational impact.

It is envisioned that this R&D project would initially be a review of key Agency software development contract experience, a review of similar outside experience and a survey of available management methodologies. New methodologies would be developed if required.

Policy Basis/Justification:

ODP has the responsibility for developing state-of-the-art software in support of Agency and selected Intelligence Community customers. Frequently, external contracting is the only feasible approach.

Contact: Name
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INFORMATION SYSTEMS PROGRAM

SOFTWARE ENGINEERING TECHNOLOGYORD/ISRD

25X1

REQUIREMENT:

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Source: DDA 25, DDA 26, DDA 27

CUSTOMER/SCENARIO:

Customer: ODP; OD&E

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INFORMATION SYSTEMS PROGRAM

SOFTWARE ENGINEERING TECHNOLOGY

CUSTOMER/SCENARIO: and documentation for the different software development stages, monitor ongoing projects, and identify critical points in the development process for management intervention. Technology transfer plans will be incorporated into these management tools. These tools will also enable better estimation of software costs and schedules based on analysis of software attributes and development methodologies.

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DESCRIPTION: An analytic framework will be developed with the customer to classify Agency software projects based on attributes of the software systems. Metrics will be developed for software characteristics and programmer/developer performance. Statistical techniques will be developed for software estimation and prediction based on post Agency and industry software experience. These statistical techniques will include trend analysis tools to predict future performance on a project based on current observables, and tools to detect significant deviations from expected values on critical performance metrics for management intervention.

	82	83	84	85	86	87	88	89
<u>FUNDING:</u>				200	325	325	150	

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